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U.S. Department  
of Transportation

East Building, PHH-30  
1200 New Jersey Avenue S.E.  
Washington, D.C. 20590

**Pipeline and Hazardous  
Materials Safety Administration**

DOT-SP 12399  
(SEVENTEETH REVISION)

**EXPIRATION DATE:** February 28, 2018

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Linde Gas North America, LLC  
Murray Hill, NJ
2. PURPOSE AND LIMITATION:
  - a. This special permit authorizes the use of certain DOT Specification 3AL cylinders, manufactured from 6061 or 6351 aluminum alloy, and aluminum cylinders manufactured under DOT-SP 12440 for the transportation in commerce of the compressed gases described in paragraph 6 below. The cylinders are requalified by one hundred percent (100%) Ultrasonic Examination (UE) in lieu of the hydrostatic test and internal visual inspection as required in § 180.205. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.
  - b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce.
  - c. Party status will not be granted to this special permit.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 172.203(a) and 172.301(c) in that each shipping paper or cylinder is not required to be marked with the special permit number; and

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§ 180.205 in that the Ultrasonic Examination (UE) is performed in lieu of the specified internal visual examination and hydrostatic pressure test for DOT-3AL cylinders made from 6061 aluminum and cylinders manufactured under DOT-SP 12440 and that UE and Eddy Current Examination (EE) are performed in lieu of the hydrostatic pressure test and internal visual examination for DOT-3AL cylinders made from 6351 aluminum, except as specified herein.

5. BASIS: This special permit is based on the application of Linde Gas North America LLC, dated October 6, 2015, submitted in accordance with § 107.105 and the public proceeding thereon.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

<b>Hazardous Materials Description</b>			
<b>Proper Shipping Name</b>	<b>Hazard Class/ Division</b>	<b>Identifi- cation Number</b>	<b>Packing Group</b>
Liquefied or non-liquefied compressed gases, or mixtures of such compressed gases, classed as Division 2.1, (flammable gas) Division 2.2, (nonflammable gas) or Division 2.3, (gases which are Toxic by Inhalation (TIH)) which are authorized in the Hazardous Materials Regulations for transportation in aluminum cylinders made in accordance with the DOT 3AL specification and DOT-SP 12440	2.1, 2.2, or 2.3	As Appropriate	N/A

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a. PACKAGING - Packagings prescribed are DOT Specification 3AL cylinders manufactured from 6061 or 6351 aluminum alloy and, as prescribed in DOT-SP 12440, cylinders manufactured from 7032 aluminum alloy. The cylinders are subjected to periodic requalification and marking as prescribed in § 180.205, except that the cylinder is examined by 100% Ultrasonic Examination in lieu of the hydrostatic pressure test and internal visual inspection as prescribed in § 180.205. Each cylinder must be subjected to an external visual examination and retested and marked in accordance with the procedure described herein and in Linde Gas North America, LLC's December 16, 1999 application for special permit on file with the Office of Hazardous Materials Safety Approvals & Permits Division (OHMSAPD) unless otherwise noted herein. A cylinder that has been exposed to fire or to excessive heat may not be retested under the terms of this special permit.

b. EQUIPMENT & PERFORMANCE.

(1) Ultrasonic System - The ultrasonic equipment performance must conform to Linde Gas North America LLC's application on file with OHMSAPD and as prescribed in this special permit. The UE equipment must be pulse echo type, and must incorporate multiple channel transducers with interactive software. The UE channels must be arranged to perform straight and angle beam examinations. The ultrasonic pulses must enter into the cylinder wall in both longitudinal directions, both circumferential directions and normal to the cylinder wall to ensure 100 percent coverage of the cylinder wall. All flaws (such as isolated pits, sidewall cracks and flaws inside the sidewall-to-base transition area (SBT)) must be detected. The transducers or cylinder must be arranged so that the ultrasonic beams enter into the cylinder wall and measure thickness and detect the sidewall flaws. The gain control accuracy must be checked annually with equipment that is calibrated in accordance with industry standards for checking gain linearity accuracy, as published in ASTM-E317. Search units of 2.25 to 10 MHz nominal frequency and 1/4" to a 1" diameter must be used during ultrasonic examination. A manual contact shear or longitudinal search unit may

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be used for confirmation and sizing of an indicated flaw. If manual UE is used, it must be performed under the direct supervision of a Senior Review Technologist by a minimum Level II Operator and in accordance with American Society of Testing & Materials (ASTM) Practice E-213 and this special permit. This safety control measure must be an integral part of the test equipment design by incorporating Lack-of-Expected-Response (LER) monitoring independent of operator actions.

(2) Eddy Current System - Equipment, such as Visual Plus or Visual Eddy, must be capable of detecting the notches on the standard reference ring.

c. Equipment performance and test procedure. The ultrasonic equipment performance, test procedure, and rejection criteria must conform to Linde Gas North America LLC's application except as specifically stated herein:

(1) UE Reference Cylinder - A cylinder or a cylinder section must be used as a standard reference and must have similar acoustic properties, surface finish and metallurgical condition as the cylinders under test. The standard reference (reference cylinder) must have a known minimum design wall thickness ( $t_m$ ) which is less than or equal to the cylinder under test.

(2) For cylinders less than or equal to 6-inches in diameter, the standard reference cylinder must have the same nominal diameter as the cylinder being tested with a tolerance of +0%/-30%.

Cylinders greater than 6-inches in diameter must conform to the allowable size ranges shown in the following table:

Standard Reference	Cylinder Size Ranges being retested by UE	
Outside Diameter (OD-inches)	Minimum OD- inches	Maximum OD- Inches
7	6.30	10.50
7.50	6.75	11.25
9.00	8.10	13.50
9.25	8.33	13.88
10.00	9.00	15.00
12.00	10.80	18.00

Prior to placing the simulated defects, such as minimum wall thickness, the average minimum wall thickness for the standard reference must be determined by means of an independent method.

(3) The standard reference (reference cylinder) must be prepared to include the following artificial defects:

- (i) The artificial defect for area corrosion must be 0.70 square inch (in<sup>2</sup>) have a depth that is less than or equal to 1/20 of the design minimum wall thickness ( $t_m$ ). The remaining wall thickness is equal to or greater than  $t_m$ .
- (ii) For cylinders less than or equal to 4 inches in diameter, the artificial defect for isolated pits must consists of an internal flat bottom hole (FBH) of 1/8 inch diameter with a depth equal to  $1/3t_m$ .
- (iii) For cylinders greater than 4 inches in diameter, the artificial defect for isolated pits must consist of an internal FBH of 1/4 inch diameter with a depth equal to  $1/3t_m$ .
- (iv) The artificial defect for line corrosion must consist of two circumferential notches (one internal and one external) and two longitudinal notches (one

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internal and one external). The notches must be created by electrical discharge machining (EDM) and must measure  $0.10t_m$  in depth, 1 inch in length and must be less than or equal to 0.010 inch in width.

(4) A certification statement signed by a Linde Gas North America LLC Senior Review Technologist (SRT) must be available for all standard references at each site where retesting is performed. The certification statement must include a standard reference drawing for each size of cylinder. A standard reference drawing must include dimensions and the locations of each simulated defect.

(5) Eddy Current Reference Ring - The reference ring must be produced to represent one or more DOT-3AL cylinders. The reference ring must include artificial notches that act as simulated neck cracks. The size of the artificial notch (depth and length) must be obtained from the EE equipment manufacturer. A certification statement signed by a Linde Senior Review Technologist (SRT) must be available for all EE reference rings at each site where retesting is performed. The certification statement must include a standard reference drawing for each reference ring. The standard reference drawing must include the depth of each notch, diameter and type of DOT-3AL cylinder for which the reference ring is used.

d. System Standardization (Calibration)

(1) Ultrasonic Examination (UE) System Standardization. Prior to retesting each specific cylinder design and type, the UE system must be standardized for testing by using a standard reference. The standard reference must be similar (i.e. material of construction, size, wall thickness, etc.) to the identified cylinders to be tested. Standardization of the UE system must be performed by using a relevant reference cylinder that is described in paragraph 7.c. of this special permit. The standardization of the UE system is as follows:

(i) A reference cylinder with an artificial defect made to represent area corrosion must be placed in

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the UE system. The UE system must be standardized to indicate rejection for a defect area equal to or greater than that of the artificial defect that is machined into the cylinder surface ( $0.70 \text{ in}^2$ ). Where the wall thickness is reduced below  $t_m$ , a straight ultrasound beam must be used to measure the wall thickness of the machined area.

(ii) A reference cylinder with a FBH made to represent an isolated pit must be placed in the UE system. The FBH must be detected by a minimum of two shear wave beams that strike the FBH from opposite sides (e.g. the first shear wave direction is from top to bottom of the cylinder and the second shear wave direction is from the bottom to top). The UE gain must be increased until the signal from the FBH is maximized at 80 percent of the screen height.

(iii) A reference cylinder with circumferential notches made to represent line corrosion must be placed in the UE system. Each internal and external notch must be detected by a minimum of one shear wave beam. The UE gain must be increased until the signal from each notch is maximized at 80 percent of the screen height.

(iv) A reference cylinder with longitudinal notches to represent a longitudinal sidewall crack (LSC) must be placed in the UE system. Each internal and external notch must be detected by a minimum of two shear wave beams that strike the LSC from opposite directions (e.g. the first shear wave direction is clock wise and second shear wave direction is counter-clock wise). The UE gain must be increased until the signal from the notch is maximized at 80 percent of the screen height.

## (2) Eddy Current Examination (EE) Equipment Standardization

The EE equipment must be standardized for each type of DOT-3AL cylinder by using a standard reference ring that includes simulated neck crack notches. The EE system is considered standardized when the probe is threaded into the mid-length of the standardization ring and the sensitivity adjusted to produce a spike that crosses the gate (i.e. 30%

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and/or 80% of screen height) as it passes over the simulated neck crack notch. The details of the equipment standardization for each type of DOT-3AL cylinder must be obtained from the manufacturer's instruction manual included as part of this standardization procedure.

e. Test Procedures.

(1) A copy of the operating test procedure (as approved and acknowledged in writing by the AAHMS) for performing ultrasonic examination of cylinders under the terms of this special permit must be at each facility performing ultrasonic examination. At a minimum, this procedure must include:

(i) A description of the test set-up; test parameters; transducer model number, frequency, and size; transducer assembly used; system standardization procedures and threshold gain used during the test; and other pertinent information.

(ii) A requirement for the equipment standardization to be performed at the end of the test interval (cal-out), after 200 cylinders or four hours, whichever occurs first. This cal-out can be considered the cal-in for the next interval during continuous operation. Cylinders examined during the interval between cal-in and cal-out must be quarantined until an acceptable cal-out has been performed. An acceptable cal-out occurs when the calibration cylinder is examined and all required features are revealed without changing examination settings. If an acceptable cal-out does not occur, if any equipment that affects the UE results are replaced or altered (such as a search unit or coaxial cable etc.) or when a loss of power occurs, all cylinders examined since the last successful calibration must be re-examined. Additionally, standardization of test equipment shall be performed when any of the following occurs: the beginning of each work shift; when the cylinder under test has dimensions that exceed the allowable ranges of the reference cylinder; when there is a change of operator(s); if any equipment that affects the UE results are replaced or altered (such as a search



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unit or coaxial cable etc.) or when a loss of power occurs; and at the end of each work shift.

(2) A copy of the most recently approved operating test procedures must be made available to a DOT representative when requested. Any change to the written procedures or in UE equipment (software or hardware), other than as supplied by the original equipment manufacturer, must be submitted to and approved by AAHMS prior to implementation.

(3) The equipment may not allow testing of a cylinder unless the system has been properly standardized (calibrated).

(4) The rotational speed of a reference cylinder must be such that all simulated defects are adequately detected, measured and recorded.

(5) The rotational speed of the cylinder under UE must not exceed the rotational speed used during the standardization.

(6) The pulse rate must be adjusted to ensure a minimum of 10% overlap for each helix.

(7) The area of Ultrasonic Examination (UE) coverage must be 100% of the cylindrical section. The coverage must extend at least three inches into the sidewall-to-base transition taper.

(8) The external surface of the cylinder to be examined must be free of loose material such as scale and dirt.

f. Acceptance/Rejection Criteria.

(1) UE Acceptance/Rejection Criteria. A cylinder must be rejected based on any of the following:

(i) The wall thickness is less than the design minimum wall thickness for the area described in the standardization section herein, paragraph 7.d.

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(ii) If any of the flaws such as the isolated pit, circumferential line corrosion or longitudinal sidewall crack (LSC) which meet the rejection criteria and produce a signal with an amplitude which crosses the reference threshold set in the standardization section (paragraph 7.d.).

(2) EE and Enhanced Visual Examination Acceptance/Rejection Criteria of the Neck Crack (Sustained Load Crack).

(1) EE Reject Criteria - One-quarter screen height indications on two consecutive revolutions of the probe at approximately the same bore location are cause for visual follow-up inspection for final disposition.

(2) Enhanced Visual Examination/Verification - Enhanced visual inspection shall be performed before and after eddy current examination or when required by eddy current examination. The inspection is performed with the use of supplemental tools, which typically include an inspection light and mirror. The light is a high intensity type and mirror is a 2-inch diameter 2X dental mirror.

g. Rejected cylinders. When a cylinder is rejected, the retester must stamp a series of X's over the DOT specification number and marked service pressure, or stamp "CONDEMNED" on the shoulder, top head, or neck using a steel stamp, and must notify the cylinder owner, in writing, that the cylinder is rejected and may not be filled with hazardous material for transportation in commerce.

(1) Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure.

(2) If a condemned cylinder contains hazardous materials and the testing facility does not have the capability of safely removing the hazardous material, the retester must stamp the cylinder "CONDEMNED" and affix conspicuous labels on the cylinder(s) stating: "UT REJECTED DOT-SP 12399. RETURNING TO ORIGIN FOR PROPER DISPOSITION". The retester may only offer the

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condemned cylinders by motor vehicle operated by a private carrier to a facility, identified to, and acknowledged in writing with OHMSPA that is capable of safely removing the hazardous material. A current copy of this special permit must accompany each shipment of condemned cylinders transported for the disposal of hazardous material.

h. Marking. Each cylinder passing retest under the provisions of this special permit must be marked as prescribed in § 180.213. Cylinders that are less than 5 inches in diameter may be marked as prescribed in § 180.213 in characters at least 1/8" high. In addition, each cylinder must be marked UE, in characters not less than 1/4" high for a cylinder with a diameter equal to or greater than 4 inches and 1/8" high for a cylinder with a diameter less than 4".

i. UE Report. A report must be generated for each cylinder that is examined. The UE report must include the following:

- (1) UE and EE equipment, model and serial number;
- (2) Transducer specification, size, frequency and manufacturer;
- (3) Specification of each standard reference used to perform UE and EE. Standard reference must be identified by serial number or other stamped identification marking.
- (4) Cylinder serial number and type;
- (5) UE technician's name and certification level;
- (6) Examination Date
- (7) Location and type of each defect on the cylinder (e.g. longitudinal line corrosion 5 inches from base);
- (8) Dimensions (area, depth and remaining wall thickness) and brief description of each defect;
- (9) Acceptance/rejection results; and
- (10) The UE report must be on file at each test facility, and copies made available to a DOT official when requested.

j. Personnel Qualification: Each person who performs retesting, and evaluates and certifies retest results must meet the following qualification requirements:

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(1) Project Manager/Director of Product Technology - is the senior manager of Linde Gas North America LLC, responsible for compliance with DOT regulations including this special permit. Additionally, the project manager must ensure that each operator and senior review technologist maintains the required certifications described herein.

(2) The personnel responsible for performing cylinder retesting under this special permit must be qualified to an appropriate Ultrasonic Testing Certification Level (Level I, II or III) in accordance with the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A depending upon the assigned responsibility as described below:

(i) System startup and calibration must be performed by a Level II operator. A Level II operator may review and certify test results. However, written procedures for accepting/rejecting a cylinder must be provided by the senior review technologist. Based upon written criteria, the Level II Operator may authorize cylinders that pass the retest to be marked in accordance with paragraph 7.h of this special permit. A person with Level I certification may perform a system startup, check calibration, and perform ultrasonic testing under the direct guidance and supervision of a Senior Review Technologist or a Level II Operator, either of whom must be physically present at the test site so as to be able to observe testing conducted under this special permit.

(ii) Senior Review Technologist (SRT) - is a person who provides written UE procedure, supervisory training, examinations (Level I and II) and technical guidance to operators, and reviews and verifies the retest results. A SRT must have a thorough understanding of the DOT Regulations (49 CFR) pertaining to the requalification and reuse of DOT cylinders that are authorized under both this special permit and ASNT Recommended Practice SNT-TC-1A and must possess either:

A. A Level III certification from ASNT in Ultrasonic Testing; or,

B. A Professional Engineer (PE) License with a documented experience for a minimum of 2 years experience in Non-Destructive Evaluation (NDE) of pressure vessels or pipelines using the ultrasonic examination technique; or,

C. A PhD degree in a discipline of Engineering/Physics with documented evidence of experience in Non-Destructive Evaluation (NDE) of pressure vessels or pipelines using the ultrasonic examination technique or research/thesis work and authoring/co-authoring of technical papers published, in recognized technical journals, in the fields of ultrasonic testing methods.

D. The SRT must prepare and submit the reports required in paragraphs 7.i. and annually verify that the UE program is being operated in accordance with the requirements of this special permit.

The most recent copies of certification (e.g. ASNT Level III, P.E.) must be available for inspection at each requalification facility.

k. OPERATIONAL CONTROLS.

(1) No person may perform inspection and testing of cylinders subject to this special permit unless:

(i) That person is an employee or agent of Linde Gas North America LLC, and has a current copy of this special permit at the location of such inspection and testing, and

(ii) That person complies with all the terms and conditions of this special permit.

(iii) That person is listed on Attachment 1 of this special permit.

(2) The marking of the retester's symbol on a cylinder certifies compliance with all of the terms and conditions of this special permit.

(3) Each facility approved by OHMSPA to test cylinders under the terms of this special permit must have a resident operator with at least a Level II Certification in UE.

(4) The UE and EE equipment and operating procedures identified in this special permit are only authorized for use when the approved SRT is available (or alternatively available by telephone or other electronic means) at each facility operating under the special permit.

(5) Notwithstanding the requirements of a RIN Approval for notification of address and personnel changes, any change in Project manager or SRT, with appropriate documentation (i.e. ANST certification), must be submitted to and acknowledged in writing by OHMSPA immediately.

8. SPECIAL PROVISIONS:

a. During the initial use of the special permit, the test data, results, and additional technical information deemed pertinent in successful application of the retest procedure must be reported to OHMSPA. The purpose of this information is to determine whether certain testing procedures and criteria require modification. In particular, special attention should be paid to evaluating and compiling information on cylinders rejected by the ultrasonic examination procedure. For these rejected cylinders, the defect causing the rejection must be fully characterized and profiled. That is, the specific type of defect should be identified (e.g. pit or general corrosion etc.) and the specific size of the defect should be determined (i.e. length, depth, width, diameter, area, etc.). Cylinder type, size, minimum design wall thickness, age, etc. of the rejected cylinder must be reported. The ultrasonic signal profile should be reported for any defect causing the cylinder to be rejected. These results must be summarized and reported to OHMSPA on an annual basis. Linde North

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America, Inc. must submit to DOT an evaluation of the effectiveness of the ultrasonic testing program authorized by this special permit as part of any request to renew the special permit submitted in accordance with § 107.109.

b. The total number of cylinders tested and rejected under this special permit must be reported to OHMSPA by cylinder class and age. These results must be summarized and reported on an annual basis.

c. Offerors may use the cylinders specified and tested in accordance with the provisions of this special permit for the transportation in commerce of those hazardous materials specified herein, provided no modifications or changes are made to the cylinders, and all terms of this special permit are complied with.

d. Shippers using the cylinders covered by this special permit must comply with the provisions of this special permit, and all other applicable requirements contained in 49 CFR Parts 100-185.

e. Transportation of Division 2.1 (flammable gases) and Division 2.3 (gases which are poisonous by inhalation) are not authorized aboard cargo vessel or aircraft unless specifically authorized in the Hazardous Materials Table (§ 172.101).

f. Transportation of oxygen is only authorized by aircraft when in accordance with § 175.501.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only and passenger-carrying aircraft, as currently authorized by the regulations for the hazardous materials being transported.
10. MODAL REQUIREMENTS: None, other than as required by the HMR.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
  - o All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.

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- o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)- "The Hazardous Materials Safety and Security Reauthorization Act of 2005" (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 Immediate notice of certain hazardous materials incidents, and 171.16 Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:



for Dr. Magdy El-Sibaie  
Associate Administrator for Hazardous Materials Safety



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Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at [http://hazmat.dot.gov/sp\\_app/special\\_permits/spec\\_perm\\_index.htm](http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm) Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

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**ATTACHMENT 1**

Only the following locations have been authorized by OHMSPA to perform requalification functions described in this special permit. Each authorization is valid only when the associated RIN approval and this special permit remain current. As acknowledged by the list of names and locations below, the grantee of this special permit must notify OHMSPA of any change in approval status, company name, address, or new test facility additions within 20 days of that change.

- H241 Linde North America, LLC  
P.O. Box 12338  
11 Triangle Drive  
Research Triangle Park, NC 27709
- H283 Linde North America, LLC (Mobile Unit)  
P.O. Box 12338  
11 Triangle Drive  
Research Triangle Park, NC 27709
- H616 Linde Gas North America LLC  
10 Arrowhead Lane  
Cohoes, NY 12047
- H876 LifeGas  
13750 Diplomat Drive  
Farmers Branch, TX 75234
- H831 LifeGas a Division of Linde Gas North  
America LLC  
5720 Kopetsky Dr. Ste N  
Indianapolis, IN 46217
- H919 Linde Gas North America LLC  
7390 Graham Road  
Fairburn, GA 30213

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